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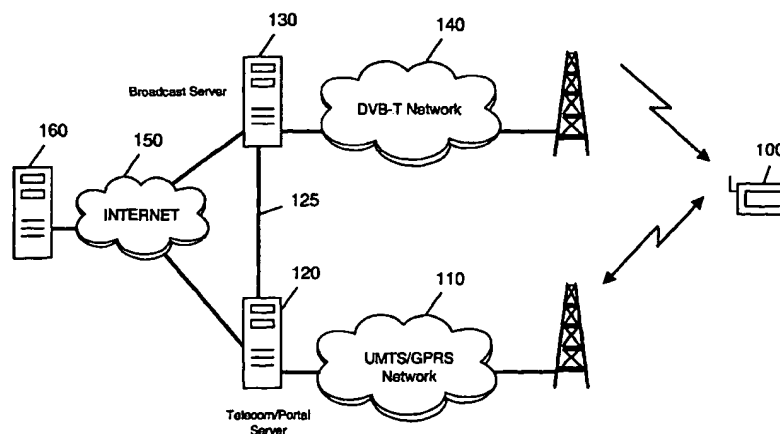
(43) International Publication Date
30 May 2003 (30.05.2003)

PCT

(10) International Publication Number
WO 03/045064 A1

- (51) International Patent Classification⁷: **H04N 7/24, H04Q 7/32**
- (74) Agent: **BERGGREN OY AB**; P. O. Box 16, FIN-00101 Helsinki (FI).
- (21) International Application Number: **PCT/FI02/00912**
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date:
18 November 2002 (18.11.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
20012256 20 November 2001 (20.11.2001) FI
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- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: **MOBILE TELECOMMUNICATION NETWORKS AND DIGITAL BROADCASTING SERVICES**



(57) Abstract: An integrated hybrid telecommunication system for providing voice, packet data and digital broadcast/multicast services to a mobile terminal (100) is disclosed. In an embodiment of the invention, the system includes a mobile telecommunication network (110) for providing lower bandwidth services and a digital broadband network (140) for delivering higher bandwidth broadcast content. In an embodiment, a broadcast service such as a video broadcast can be viewed by selecting the service on e.g. a portal page displayed on the mobile terminal (100). The request is received by the mobile telecommunication network (110), which is coupled to the broadcast network (140) for retrieving the associated service parameters. The service parameters are transmitted to the mobile terminal (100) via the mobile telecommunication network (110). The received parameters enable a broadcast receiver in the mobile terminal (100) to receive the broadcast service transmitted by the broadcast network (140).

Mobile Telecommunication Networks and Digital Broadcasting Services

FIELD OF THE INVENTION

- 5 The present invention relates generally to mobile telecommunication networks and, more particularly, to the delivery of digital services to wireless mobile terminals that are accessible through portal pages.

BACKGROUND OF THE INVENTION

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The deployment of advanced high bit-rate mobile networks has opened up new opportunities for delivering a host of services in a way that was not possible with earlier second generation wireless networks. Third generation systems such as Universal Mobile Telephone Service (UMTS) or even lower bit-rate systems such as High Speed Circuit
15 Switched Data (HSCSD) and General Packet Radio Service (GPRS) specified for use with the Global System for Mobile Communications (GSM) wireless standard, will enable the delivery of new digital services such as video calls and the playback of multimedia applications that are comprised of audio and video clips.

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Although the increased bit-rates of UMTS systems widen the possibilities for providing digital services, many estimates forecast that these systems can reliably deliver data rates between 64 to 384 kbit/s to moving mobile terminals. Bit rates of up to 2 Mbit/s can be achieved for stationary environments. These rates provide pretty good performance for delivering high quality digital audio and acceptable quality moving image clips. However,
25 at these transfer rates it will be difficult to handle exceedingly high data intensive tasks such as delivering high quality full-motion video and transferring very large data files to mobile terminals. Attempts at downloading huge data files will likely lead to inconveniently long downloading times which probably would not be the most economical in terms of cost per megabyte. For this and other reasons, alternative broadband delivery channels have
30 been investigated that could provide a practical solution for high data intensive tasks in terms of lower cost and convenience for the parties involved.

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One such delivery channel that has shown promise is Digital Video Broadcasting DVB-T). DVB-T, which is related to DVB-C (cable) and DVB-S (satellite), is the terrestrial variant of the DVB standard and is a wireless point-to-multipoint data delivery mechanism

developed for digital TV broadcasting and based on the MPEG-2 transport stream for the transmission of video and synchronized audio. DVB has the capability of efficiently transmitting large amounts of data over a radio channel to a high number of users at a lower cost, when compared to data transmission through mobile telecommunication networks using e.g. UMTS/GPRS. DVB-T data rates have been shown to provide up to 4-20 Mbit/s, where the lower end of the range corresponds to reception within a very high speed (300 km/h) moving receiver. Another advantage of DVB-T is that it has proven to be exceptionally robust in that it works well in geographic conditions that would normally affect other types of transmissions, such as the rapid changes of reception conditions, and hilly and mountainous terrain.

Digital broadband data broadcast networks are known. As mentioned, an example of such a network enjoying popularity in Europe and elsewhere world-wide is Digital Video Broadcast (DVB) which in addition to the delivery of televisual content is capable of delivering data. Other examples of broadband data broadcast networks that provided under the Advanced Television Systems Committee (ATSC). Both ATSC and DVB utilize a containerization technique in which content for transmission is placed into MPEG-2 packets which act as data containers. Thus, the containers can be utilized to transport any suitably digitized data including, but not limited to High Definition TV, multiple channel Standard definition TV (PAL/NTSC or SECAM) and, of course, broadband multimedia data and interactive services.

The combined use of mobile telecommunications with a broadband delivery channel such as DVB-T has been proposed in the past in order to achieve efficient delivery of digital services to users on the move. This would take advantage of existing infrastructures in the effort to provide personal communications (already prevalent) and the growing demand for Internet access, together with the expected rise of digital broadcasting, so that users can receive these services with a single device. Furthermore, DVB-T is a cross platform standard that is shared by many countries thereby making frequency compatibility and roaming less of an issue. The combination of the mobile telecom and at a relatively very low cost digital broadband channel provides the possibility of interactive services such as uni-directional and bi-directional services such as audio and video streaming (TV & Radio), file downloads and advanced gaming applications etc.

However, there are some challenges with developing the mobile terminals needed for combined use with e.g. DVB-T. A significant issue to consider is that power consumption

for mobile terminals must be low enough to provide sufficient use while operating independently from power sources. DVB-T terminals have in the past had high power consumption rates which make them unsuitable for sustained use. This is partly due to the way DVB operates where receivers regularly access broadcast Service Information (DVB-SI) that accompany DVB signals which assist the receiver/decoder and the viewer to navigate through the array of services offered. The data is also necessary for the receiver/decoder to automatically configure itself to decode the received broadcast stream that is included in the Program Specific Information (PSI) specified by, for example, the MPEG-2 systems standard. The DVB-SI specifies additional data based on data tables that complement the PSI by providing data to aid in the automatic tuning of receiver/decoders and provides additional information intended for display to the user.

In the development of DVB-T, it was envisioned that signal reception would be mainly carried out by set-top boxes in generally stationary environments where power consumption issues were largely unimportant. However with reception by e.g. mobile handheld devices, the requirement of DVB-T to regularly access Service Information data tables places a heavy power burden on the terminal. This is especially the case when the SI tables are accessed even when the user does not want to view a program for some length of time. In mobile terminals that also operate as telecom devices, power consumption is a particularly important issue since users expect sufficiently reasonable battery life for necessary communication purposes which they expect to be available. At present, it is only possible to build DVB-T mobile receivers with only a few hours of operating time. With improved operating life, data packet based terminals can be left on practically all of the time fulfilling the promise of anytime and anywhere mobile communications.

In view of the foregoing, it is desirable to improve the operating times of mobile terminals that are operable with mobile telecommunication and digital broadcast networks.

SUMMARY OF THE INVENTION

Briefly described and in accordance with an embodiment and related features of the invention, in an apparatus aspect of the invention there is provided a system for providing services to a mobile terminal (100) characterized in that said services include broadband services and lower bandwidth services, comprising:

a mobile telecommunication network (110);

at least one mobile telecommunication service server (120) coupled to the mobile telecommunication network (110) for providing said lower bandwidth services;

a broadcast network (140);

at least one broadcast service server (130) coupled to the broadcast network (140)
5 for providing broadband services; and

a portal server (120) coupled to the mobile telecommunication network (110) and the at least one broadcast service server (130), said servers communicating with the mobile terminal (100) via the mobile telecommunication network (110) for providing information relative to the services.

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In a related apparatus aspect of the invention there is provided a portal server coupled to a broadband network (140) and to a lower bandwidth network (110) for providing broadband and lower bandwidth service transmissions to a mobile terminal (100), characterized in that said portal server comprises:

15 means for accessing selectable service information relative to said broadband service transmissions;

means for accessing selectable service information relative to said lower bandwidth service transmissions; and

a controller for selecting service information for said broadband and lower bandwidth
20 service transmissions based on a service request by a user of the mobile terminal (100).

In a method aspect of the invention, there is provided a method of accessing a telecommunication system by a mobile terminal (100) for receiving voice, packet data, and broadcast services, wherein the telecommunication system is comprised of a mobile
25 network (110) linked to a telecom server (120) and a portal server (120), a broadcast network (140) linked to a broadcast server (130) and to the mobile network (110), and wherein the mobile terminal (100) is capable of communicating with the mobile network (110) and receiving broadcasts from the broadcast network (140), the method is
characterized in that the service information associated with a broadcast from the
30 broadcast network (140) is obtained by the mobile terminal (100) via the mobile network (110), thereby lowering power consumption by the mobile terminal (100) by avoiding alternative high power actions for obtaining said information.

In a device aspect of the invention, there is provided a wireless handheld mobile terminal
35 100 for providing services to a user characterized in that said mobile terminal comprises:

a radio frequency transceiver for communicating with a mobile telecommunication network (110) for receiving lower bandwidth services;

a broadcast receiver for receiving broadband services from a digital broadcast network (140);

5 an input user interface (420) including selectable links to access service information relative to broadband and lower bandwidth services for entering user request to selected service to be transmitted via the mobile telecommunication network (110);

a CPU (404) connected to said radio frequency transceiver and to said broadcast receiver for controlling communication with the mobile telecommunication network (110)
10 and the reception of broadband services; and

a means for displaying requested service to the user.

In a product aspect, there is provided a computer program product comprising program instructions executable by a computing system for operating networks that provide mobile
15 telecommunication services and digital broadcast content to a mobile terminal (100), comprising:

computer program code for receiving a user request from the mobile terminal (100) for information relating to broadcast content sent via the mobile telecommunications network (110);

20 computer program code for executing the user request and sending the information to the mobile terminal (100) using packet data transmission;

computer program code for facilitating communication between a mobile telecommunication network (110) and a broadcast network (140) hosting the broadcast content; and

25 computer program code for performing the transmission of broadcast content from the broadcast network (140) to the mobile terminal (100).

In a further apparatus aspect, an Electronic Program Guide (EPG) for comprising information on broadband services provided by a broadband network (140), characterized
30 in that the Electronic Program Guide information is accessible to a wireless mobile terminal via a portal page (160) communicated through a mobile telecommunication network (110), and wherein broadcast service parameters associated with a user selected broadcast service are sent via a portal server (120) coupled to the broadband network (140) and the mobile telecommunication network (110).

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, together with further objectives and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings in which:

Figure 1 illustrates a hybrid mobile telecom and DVB-T system operating in accordance with an embodiment of the invention;

Figure 2 depicts an exemplary portal and its interrelation with data content residing on the telecom and broadcast networks;

Figure 3 is a flow diagram of a typical data access procedure operating in accordance with the embodiment of the present invention;

Figure 4 shows a block diagram of the basic components in an exemplary mobile terminal (MMT) that is suitable for use with the embodiment of the invention;

Figure 5 illustrates a second embodiment of the invention that depicting the detailed use of an exemplary hybrid network portal and its interrelation with data content residing on the telecom and broadcast networks;

Figure 6 depicts a user interface of a portal page downloaded on terminal display according to the second embodiment of the invention;

Figure 7 depicts a user interface of selectable services downloadable to terminal according to the second embodiment of the invention;

Figure 8 depicts a user interface of selected music video services downloadable to terminal according to the second embodiment of the invention;

Figure 9 depicts a user interface of selectable telecom services downloadable to terminal according to the second embodiment of the invention;

Figure 10 depicts a user interface of selectable ringing tones downloadable to terminal according to the second embodiment of the invention;

DETAILED DESCRIPTION OF THE INVENTION

In the following description of the various embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration of embodiments in which the invention may be practiced. It is to be understood that other embodiments may be utilized, and structural and functional modifications may be made without departing from the scope of the present invention. Although reference is made to a terrestrial digital video broadcasting network (DVB-T), it should be understood that the invention is applicable to any such digital broadband data broadcast network, and therefore the invention is not intended to be limited by references to DVB-T.

In accordance with an embodiment of the invention, handheld mobile terminals such as those capable of performing mobile communications and receiving digital broadband data broadcasts is able to decrease power consumption by reducing the number of high power activities the terminal must perform. The telecom network as referred to herein includes all components of the mobile network and associated servers such as a telecom server and a portal server. In an embodiment of the invention, power conservation is achieved by increasing the period of time the terminal is inactive by eliminating the necessity for regularly accessing the service information data for DVB-T broadcasts. This step is normally taken periodically to monitor the transmitted bit stream to check what is currently being broadcasted in the air, as specified e.g. in DVB Document A038 Rev.1 "Specification for service information (SI) in DVB Systems, or ETSI EN 301 192.

Figure 1 illustrates a hybrid mobile telecom and DVB-T system operating in accordance with the embodiment of the invention. The system provides an interactive capability for users using mobile terminal 100 via a return channel through e.g. a UMTS, GPRS, GSM, WAP or other cellular network (or any combination thereof) to select specific broadcast programs transmitted from the digital Broadcast network 140. The user first accesses a portal page hosted on the Telecom/Portal server 120. The portal page may be, for example, a Wireless Application Protocol (WAP) page fetched from Telecom Server 120, in which various selectable links are displayed on terminal 100. The portal may be that of a general purpose page that contains links to a wide variety of services such as TV programs, games, music, news, banking, shopping etc. By way of example, when one wants to view a broadcasted TV program, the user selects the TV link which brings up a page that displays what is currently broadcasting in the air. The user could further select

an option to begin reception of the TV program currently playing or some subsequent program, since the Broadcast server 130 typically broadcasts on a program schedule in carousel fashion.

- 5 The selection procedure begins when the user clicks a hyperlink "n" associated with a service on the portal page. After which the terminal browser sends "get n" message to the Telecom server 120. If hyperlink "n" is to a service provided by Broadcast server 130, the Telecom server 120 sends a request to the Broadcast server 130 to send service parameters such as the tuning frequency, port, IP address, Program Identifier (PID), cell
10 location, media access control (MAC), bandwidth, fft, constellation, code rate, guard interval, hierarchy and/or hierarchical priority, time, that are needed by the terminal e.g. when the service is offered on top of Internet Protocol, as shown in Table 1. The Telecom server 120 forwards service parameters to terminal 100 via the UMTS/GPRS Network 110. From the received bit stream the terminal is able to determine the type of service. For
15 example, if the desired stream is currently being broadcasted, the terminal turns on the broadcast receiver and launches a media player for playing back the stream. If the stream is e.g. a game application or music file that will be broadcasted in, for example, t+10 minutes, the terminal 100 turns on the broadcast receiver at t+10 minutes time in order to download and (optionally save) the file. When a future download is scheduled to occur at
20 e.g. t+10 minutes, the terminal 100 can check the field strength at t+9 minutes and notify the user of a weak field in order to reposition the terminal for better reception.

	Frequency	PID	PORT	IP Address	Time
Service	783,25	13 bit number (0-8192)	21	192.168.1.128	13.52.30- 13.55.09

TABLE 1

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- Typically only the necessary parameters related to the selected service are sent to the terminal, although it is possible to send parameters for all services which is generally unnecessary. The security issues such as encryption/decryption keys are typically handled by the native security provided by cellular channel in the WAP protocol, for
30 example.

When a selected service resides on a server outside the system, such as banking services for example, a connection to an external server 160 can be achieved via the Internet 150 using standard WAP procedures, for example. A multitude of services are

accessible by the user through the Internet 150 are available such as e.g. banking, placing stock trades, making airline reservations, and shopping (e-commerce) etc. In these cases only the mobile network 110 side is used such that any necessary secure connections are established using a security layer such as Wireless Transport Layer Security (WTLS) in WAP, for example.

Figure 2 depicts an exemplary portal and its interrelation with content residing on the telecom and broadcast networks. The terminal accesses the portal page 200 which is, for example, a WAP start or home page. The Telecom/Portal server 120 can consist of a single server or an n number of servers (where separate Telecom and Portal servers are shown). Broadcast server 130 can also consist of a plurality of servers which provide sufficiently large storage space for hosting content for the Broadcast Network. It should also be noted that the Telecom/Portal server 120 and Broadcast server 130 may be logical servers which do not have to be separate physical entities. In the figure, the portal start page is compiled on server 2 consisting of services on server 1 and 3 and perhaps containing services of web pages.

Figure 3 is a flow diagram of a typical data access procedure operating in accordance with an embodiment of the present invention. In step 300, a portal start page is displayed on the terminal having a built-in browser when the device is switched on, for example. The portal page lists a plurality of links that may be in an arrangement that is predetermined or is customized by the user. The links on the portal page are often ones that are of most interest to the user. In step 305, the user selects a link by "clicking" on it which in turn causes the terminal to send a request (step 310) to the Portal Server 120 of the telecom network via e.g. the WAP protocol. The telecom network determines whether the desired content resides on the Telecom Server 120, Broadcast Server 130, or a server 160 on the Internet, as shown by step 315. If the content is hosted on Telecom Server 120, it is retrieved and sent to the terminal through the UMTS/GPRS network 110, as shown by step 320. If the content resides on an external Internet server 160, it is retrieved using standard Internet Protocol and sent to the terminal via the UMTS/GPRS network 110, also shown by step 320.

If the data is hosted on the Broadcast Server 130, the Portal server 120 makes a request (step 325) to receive the service parameters from the Broadcast Server 130 via link 125, as shown in step 330. The request and response may be routed through the link 125 or via the Internet 150 if the telecom network and the broadcast network are geographically

distant, such as in different parts of a city or in different cities for example. The Portal server 120 sends the service parameters to the terminal vial the UMTS/GPRS network 110, as shown in step 335. The terminal sets the internal broadcast receiver (step 340) to receive the broadcast by tuning to the correct frequency and other tasks such as setting
5 the right PID to demux, and if the services are on top of IP/TCP, UDP etc., the packets that have the right address and port number go to IP stack that handles IPsec, for example. The broadcast receiver is turned on in advance so that it has time to stabilize before the service is broadcasted, and such that the receiver is turned off after the broadcast.

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A suitable media player is launched to begin playing the streamed broadcast on the terminal display, as shown by step 345. The media player is typically a software program executing on the terminal that may be upgradeable through the air via the telecom network. The level of the user's viewing privileges can be set by previous agreements with
15 either the telecom or broadcast operators and regulated by the media player software e.g. to control access to pay per view programs or programs restricted from viewing.

A hybrid network portal may be implemented where services in many different networks can be accessed from a single point of access (portal). Some of the services are delivered
20 through the telecom network and others by broadcast networks. This means that the broadcast receiver part of the terminal can be kept switched off when the broadcast services are not subscribed. In other words, the broadcast service parameters are sent using the telecom network instead of sending Electronic Program guide (EPG) or service announcement tables through broadcast network. Therefore, the broadcast receiving part
25 of the terminals don't need to listen to the stream to know what services are available, thus eliminating the regularly occurring scans of the broadcast stream that are power consuming. A further advantage is that, when the user selects the TV link, the program information is retrieved immediately so it is not necessary for the information to be stored locally on the terminal, nor is it necessary for the terminal to wait for the next data
30 broadcast to obtain the information as in the prior art. The method of the invention permits the user to have the possibility of selecting only those programs and/or files that they are interested in. The Broadcast Server 130 sends updates of the current broadcast to the Portal Server 120 which are suitably formatted for display on handheld devices such as mobile terminals.

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Billing for the received broadcast services can be performed through normal telecom billing procedures. This is possible since all requests for services are routed through the telecom network is kept track of by a billing server associated with the network. These are typically the same components that are used for calculating the user's telecom and
5 roaming charges using e.g. a ubiquitous GSM/UMTS billing platform. This technique would take advantage of existing infrastructure and permit users to receive broadcast services even while roaming and enables users to receive a single bill for all services used. The use of GPRS provides an attractive return channel since the user is billed for transferred data and not for the connection time.

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One way that billing for broadcast services can be triggered is when e.g. the broadcast keys are sent to the user which allow the terminal to decrypt the digital packets, although other triggering events can be implemented in the system. The embodiment of the invention enables convenient billing for telecom services and digital services via a low
15 cost broadband delivery channel. The content may be protected in various manners. DVB has specified Conditional access in e.g. document "SUPPORT FOR USE OF SCRAMBLING AND CONDITIONAL ACCESS WITHIN DIGITAL BROADCASTING SYSTEMS DVB DOCUMENT, A007 February 1997". If the content is distributed using Internet Protocol then, IPsec or IPv6 security can be used, and in which case, the
20 telecommunication channel would most likely be used to exchange related information.

The terminal 100 used in the invention is a mobile terminal with the capability to receive digital broadcasts and access standard mobile telecommunications networks with voice and data services using UMTS/GPRS and WAP, for example. The terminal contains many
25 standard mobile telecommunication components including a processor, memory (RAM and flash), and software such as a browser and a media player. A more detailed description of an interactive mobile terminal containing mobile telecommunications capability and DVB-T broadcast reception capability is given in International publication WO 01/17255 on behalf of the present Applicant. The terminal may also be fitted with a
30 Digital Audio Broadcast (DAB) receiver for receiving digital audio broadcasts from radio stations or for receiving digital audio broadcasted using DVB-T and MPEG2 formats. It is also possible to equip the terminal with Bluetooth functionality for interacting with other Bluetooth compatible devices.

35 Figure 4 shows a block diagram of the basic components in an exemplary mobile terminal that is suitable for use with the embodiment of the invention. The mobile terminal 100

provides fully functioning wireless communications that operate in accordance with standard mobile telecommunications protocols such as UMTS/GPRS, GSM, CDMA, and TDMA, etc. Integrated in the mobile terminal is a DVB-T digital broadcast receiver, a digital display for providing user interactivity in a mobile environment for viewing
5 broadcasts. The interactive messages can be sent to the telecom network using WAP or even SMS messaging. In the mobile terminal, a DVB-T receiver 402 is capable of receiving digital TV broadcasts in accordance with the DVB-T standard. In addition to TV broadcasts, channels in the DVB-T spectrum can be used to transmit digital data intended for receipt by specific users, which are typically encrypted for privacy and requiring
10 encryption keys for playback.

A media decoder 406 is controlled by a CPU 404 and is used to decode the received DVB-T broadcast. The media decoder 406 can decode signals in e.g. MPEG-2 and MPEG-4 formats in the broadcast stream, or Real Media or Windows Media formats can
15 be used in addition to others. Alternatively, the decoder can be selected to match other transmitted data protocols from the broadcasted service.

A display interface 408 receives the decoded broadcast from the media decoder 406. The display interface 408 is designed to optimize the display of data to a user of the MMT 400.
20 For example, the digital data received can be in the form of a full-motion video movie or can be some other kind of graphic, since various formats require compatible modes to be optimally displayed. The display interface 408 acts as a video integrator e.g. it has the ability to place a graphics overlay onto a full-motion video and manipulate the display of the video by moving to another part of the display and cropping to show essential moving
25 parts, for example. The output of the display interface 408 drives the display 410 of the mobile terminal 400. In the embodiment, the mobile terminal 400 is equipped with WAP capability 412 to provide a data connection to the telecom network via GPRS block 416. The UMTS block 414 provides circuit switched voice connections to the UMTS network and works together with the GPRS 416 for data communications to the network. All the
30 components are controlled by CPU 404 in accordance with the environment. For example, when voice data is to be transmitted, the UMTS link is activated and voice transmissions are exchanged with the telecom network.

The DVB-T receiver 402 of the mobile terminal 400 is activated or deactivated by the CPU
35 404. The DVB-T receiver 402 can be activated manually by the user such as when the user wishes to receive a broadcast movie or is expecting to receive a broadcast file. The

CPU 404 receives the service parameters associated with a current or future broadcast by accessing the Portal Server 120 via the UMTS/GPRS network 110. The reception of the service parameters can be initiated by the user (by clicking a link) or automatically by preprogrammed action by the user. Furthermore, push services can be implemented in the UMTS/GPRS network to send a message which is displayed to notify the user that a desired TV program will be broadcasting in e.g. 5 minutes and to confirm whether the user wishes to view it via a dialog box, for example. A message and dialog box could display something like: "The World News will be broadcast in 5 minutes. If you would like to view the broadcast select 'OKAY' else select 'CANCEL'."

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The DVB-T receiver 402 is equipped with a timing element 418 enabling it to remain synchronous with the digital broadcast network. The timer 418 makes it possible to switch on the receiver and pick up the selected data packets after a long period (perhaps days) after the last system synchronization. The timer 418 also enables the CPU 404 to provide power management by powering down the DVB-T and other activities when not in use. For example, video functionality is automatically shut down when not in use i.e. digital broadcasts that are not currently in use or not needed such as when web browsing or making voice calls.

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Figure 5 illustrates a second embodiment of the invention that depicting the detailed use of an exemplary hybrid network portal 120 and its interrelation with data content residing on the telecom and broadcast networks. The content databases 510 in telecom side and content databases 520 on the broadcast side can be maintained by different operators and can be linked to the portal server 120. The list of databases (information about the content) are connected to the portal server such that users can have access to the content via portal through a portal page from the mobile terminal 100. Use of the hybrid network portal permits allows a single access point for services from different networks, whereby some services can be delivered through the telecommunications network and others can be delivered through broadcast network. The broadcast service parameters are sent using bi-directional mobile network to the mobile terminal instead of sending Electronic Program guide (EPG) or service announcement tables through broadcast network. This dramatically decreases the power consumption of the mobile terminal since the DVB-T receiver is activated only when broadcast transmissions are occurring which replaces the need for continuous monitoring of the DVB-T network for available services. Furthermore, the single access point of the portal page interface operates independently of the protocol or channel used to access the services.

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Figure 6 depicts an exemplary portal page 160 and user interface of selectable services downloadable to terminal in accordance with the second embodiment of the invention. The exemplary portal page shows choices for the user to select between Broadcast Services and Telecom Services. Examples of Broadcast Services may include: videos, music (in a digital format), and large file downloads such as programs, games etc. Such broadcast services may be continuously broadcasted in a e.g. a carousel fashion over the air. Examples of Telecom Services provided, in addition to conventional voice services, may include downloading ringing tones, browsing, and some file downloads. The portal page represents a convenient access point describing available services in a quick and efficient manner using a wireless data protocol such as WAP.

Figure 7 depicts an exemplary portal page obtained after the user has selected "videos" from the prior portal page of Figure 6. The user interface shows selectable video services downloadable to terminal. Similarly, various types of videos are available which include e.g. sports, funny stuff, music, what's new, art, top ten videos as shown in the figure. A further selection of a topic on this page leads to a subsequent page containing more detailed information on the selected topic. By way of example, if the topic "music" is selected, the user gets a selection of music available for reception as shown in Figure 8. This "music" page depicts a user interface showing selected music video services downloadable to terminal. At the same time, the service information parameters are sent to the mobile terminal permitting the broadcast receiver to correctly receive the broadcast of the selected song.

Figure 9 shows a an example of a portal page and user interface of selectable telecom services downloadable to terminal according to the second embodiment. The page depicts a number of selectable telecom services, which are identified as such to indicate the network used. In the event that the user selects "Ringing Tones", as shown in the figure, a new page is fetched displaying various ring tones that the user may wish to receive. Figure 10 depicts an exemplary page presenting various ring tones for the user to download. The ring tones may be located on the Telecom server 120 or on an Internet Server 100 offered by a third party. The reception of downloaded telecom services typically operate via the telecom network in a manner consistent with UMTS, GPRS, and GSM protocols which may involve WAP or other wireless data protocols.

Although the invention has been described in some respects with reference to a specified embodiment thereof, variations and modifications will become apparent to those skilled in the art. For example, it is possible to adapt the invention to broadcast and receive digital audio broadcasts (DAB), which is an international digital standard for radio stations that is slated to replace analog broadcasts. Furthermore, it may be possible to utilize a broadcast function operable with UMTS networks for delivering data to multiple users. It is therefore the intention that the following claims not be given a restrictive interpretation but should be viewed to encompass variations and modifications that are derived from the inventive subject matter disclosed.

CLAIMS

1. A system for providing services to a mobile terminal (100) **characterized in that** said services include broadband services and lower bandwidth services, comprising:
 - 5 a mobile telecommunication network (110);
 - at least one mobile telecommunication service server (120) coupled to the mobile telecommunication network (110) for providing said lower bandwidth services;
 - a broadcast network (140);
 - 10 at least one broadcast service server (130) coupled to the broadcast network (140) for providing broadband services; and
 - a portal server (120) coupled to the mobile telecommunication network (110) and the at least one broadcast service server (130), said servers communicating with the mobile terminal (100) via the mobile telecommunication network (110) for providing information relative to the services.
2. The system according to claim 1 **characterized in that** the mobile terminal (100) is capable of receiving the provided services independent of the service using the information relative to the services provided by the common portal server (120).
3. A system according to claim 1 **characterized in that** the mobile terminal (100) is a multimedia terminal comprising voice and packet data telecommunication functionality, a browser for interfacing with the packet data, and a broadcast receiver for receiving digital broadcasts from the broadcast network (140).
4. A system according to claim 1 **characterized in that** the mobile terminal (100) includes a browser capable of operating with any one of WAP, XHTML, CHTML, and HTML protocols for transmitting and receiving packet data with the mobile telecommunication network (110).
5. The system according to claim 1, **characterized in that** the lower bandwidth services comprise mobile services and packet data services transmitted via mobile telecommunication network (110).
6. A system according to claim 1 **characterized in that** the mobile telecommunication network (110) is a network such as UMTS/GPRS or WCDMA network wherein

packet data is capable of being exchanged between the network (110) and the mobile terminal (100).

- 5 7. The system according to claim 1, characterized in that the broadband services comprise digital broadcast services.
8. A system according to claim 1 **characterized in that** the broadcast network is a digital broadband broadcast network such as DVB-T or DAB.
- 10 9. A system according to claim 8 **characterized in that** the broadcast service such as a TV program is broadcast to the mobile terminal (100) from the broadcast server (130) via the DVB-T network (140).
- 15 10. The system according to claim 1, characterized in that a portal page (160) provides the information relative to the services to the mobile terminal (100).
11. A system according to claim 1 **characterized in that** a portal page is hosted on the portal server (120) and displayed on the mobile terminal (100) in the form of selectable hyperlinks.
- 20 12. A system according to claim 1 **characterized in that** the mobile telecommunication network (110,120) and the broadcast network (140) each host a connection to the Internet (150) for accessing content from servers from the Internet.
- 25 13. A portal server coupled to a broadband network (140) and to a lower bandwidth network (110) for providing broadband and lower bandwidth service transmissions to a mobile terminal (100), characterized in that said portal server comprises:
- 30 means for accessing selectable service information relative to said broadband service transmissions;
- means for accessing selectable service information relative to said lower bandwidth service transmissions; and
- a controller for selecting service information for said broadband and lower bandwidth service transmissions based on a service request by a user of the mobile terminal (100).

14. The portal server of claim 13, characterized in that the portal server further comprises means to route the service request by the user to a selected service provider.
- 5 15. The portal server of claim 13, characterized in that the portal server (100) further comprises means for transmitting the selected service information to the mobile terminal (100) based on the service request by the user of the mobile terminal.
- 10 16. A method of accessing a telecommunication system by a mobile terminal (100) for receiving voice, packet data, and broadcast services, wherein the telecommunication system is comprised of a mobile network (110) linked to a telecom server (120) and a portal server (120), a broadcast network (140) linked to a broadcast server (130) and to the mobile network (110), and wherein the mobile terminal (100) is capable of communicating with the mobile network (110) and
- 15 receiving broadcasts from the broadcast network (140), the method is **characterized in that** the service information associated with a broadcast from the broadcast network (140) is obtained by the mobile terminal (100) via the mobile network (110), thereby lowering power consumption by the mobile terminal (100) by avoiding alternative high power actions for obtaining said information.
- 20 17. A method according to claim 16 **characterized in that** the mobile network (110) exchanges packet data with the mobile terminal (100) using the UMTS/GPRS protocol.
- 25 18. A method according to claim 16 **characterized in that** the broadcast network (140) broadcasts signals in accordance with the DVB-T standard.
- 30 19. A method according to claim 16 **characterized in that** the mobile terminal (100) is a mobile terminal comprising mobile voice and packet data telecommunication functionality, a browser for interfacing with the packet data, and a broadcast receiver for receiving digital broadcasts from the broadcast network (140).
20. A method according to claim 16 **characterized in that** the mobile network (110) is a voice and packet data capable network such as a UMTS network.

21. A method according to claim 16 **characterized in that** the accessing of the portal page and data communication between the mobile terminal (100) and the mobile network (110) is performed using the WAP or HTTP protocols.
- 5 22. A method according to claim 16 **characterized in that** the broadcast services that include TV programs, movies, digital radio, music files, data files, interactive games etc. which are broadcasted in a carousel or streaming manner over the air.
- 10 23. A method according to claim 16 **characterized in that** the service parameters transmitted to the mobile terminal (100) include the tuning frequency, IP address, Program ID (PID), time, encryption keys etc. for enabling the reception of the broadcast service.
- 15 24. A method according to claim 16 **characterized in that** the service parameters are requested from the mobile network (110) and retrieved from the broadcast network (140) via the Internet, especially if they are geographically distant.
- 20 25. A method according to claim 16 **characterized in that** the broadcast network (140) broadcasts digital audio using DVB-T or MPEG-2 format to the mobile terminal (100).
- 25 26. A method according to claim 16 **characterized in that** the broadcast services are broadcast by the mobile network (110) using the native broadcast functionality in UMTS.
27. A method according to claim 16 **characterized in that** the mobile terminal (100) can be preprogramed to display or save broadcasted content starting at the appropriate scheduled time of the broadcast.
- 30 28. A wireless handheld mobile terminal 100 for providing services to a user characterized in that said mobile terminal comprises:
a radio frequency transceiver for communicating with a mobile telecommunication network (110) for receiving lower bandwidth services;
a broadcast receiver for receiving broadband services from a digital broadcast
35 network (140);

an input user interface (420) including selectable links to access service information relative to broadband and lower bandwidth services for entering user request to selected service to be transmitted via the mobile telecommunication network (110);

5 a CPU (404) connected to said radio frequency transceiver and to said broadcast receiver for controlling communication with the mobile telecommunication network (110) and the reception of broadband services; and

 a means for displaying requested service to the user.

10 29. A wireless handheld terminal according to claim 28 characterized in that the terminal further comprises means for obtaining service information related to the broadcast content via the mobile telecommunication network (110).

15 30. A wireless handheld terminal according to claim 28, characterized in that the terminal further comprises a media decoder connected to the broadcast receiver and the CPU to decode the broadcast content received over the air.

20 31. A wireless handheld terminal according to claim 28, further comprising means for audio output for reproducing high quality audio associated with the broadcast content.

32. A computer program product comprising program instructions executable by a computing system for operating networks that provide mobile telecommunication services and digital broadcast content to a mobile terminal (100), comprising:

25 computer program code for receiving a user request from the mobile terminal (100) for information necessary for receiving the broadcast content which is sent via the mobile telecommunications network (110);

 computer program code for executing the user request and sending the information to the mobile terminal (100) using packet data transmission;

30 computer program code for facilitating communication between a mobile telecommunication network (110) and a broadcast network (140) hosting the broadcast content; and

 computer program code for performing the transmission of broadcast content from the broadcast network (140) to the mobile terminal (100).

33. A computer program product according to claim 32, further comprises means for operating a telecom server and/or a portal server (120) connected to the telecommunication network (110).
- 5 34. A computer program product according to claim 32, further comprises means for operating a broadcast server (130) connected to the broadcast network (140) and to the telecommunication network (110).
- 10 35. A computer program product according to claim 32 wherein the program code for sending information necessary for receiving the broadcast content, such as frequency, time, PID, IP address port etc., to the mobile terminal (100) is implemented in a data transmission protocol such as WAP or HTTP.
- 15 36. An Electronic Program Guide (EPG) for comprising information on broadband services provided by a broadband network (140), characterized in that the Electronic Program Guide information is accessible to a wireless mobile terminal via a portal page (160) communicated through a mobile telecommunication network (110), and wherein broadcast service parameters associated with a user selected broadcast service are sent via a portal server (120) coupled to the broadband network (140)
- 20 and the mobile telecommunication network (110).

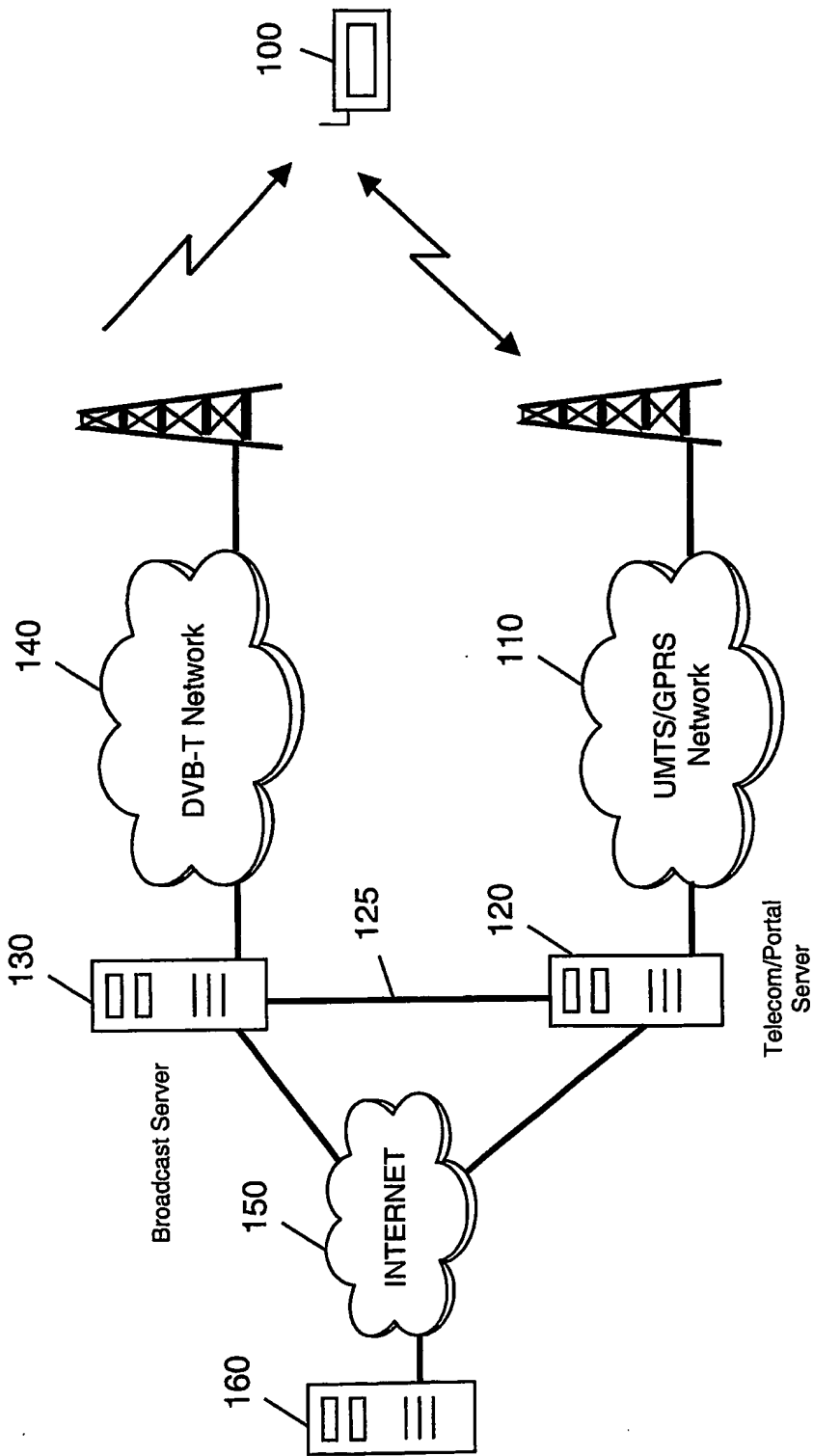


Figure 1

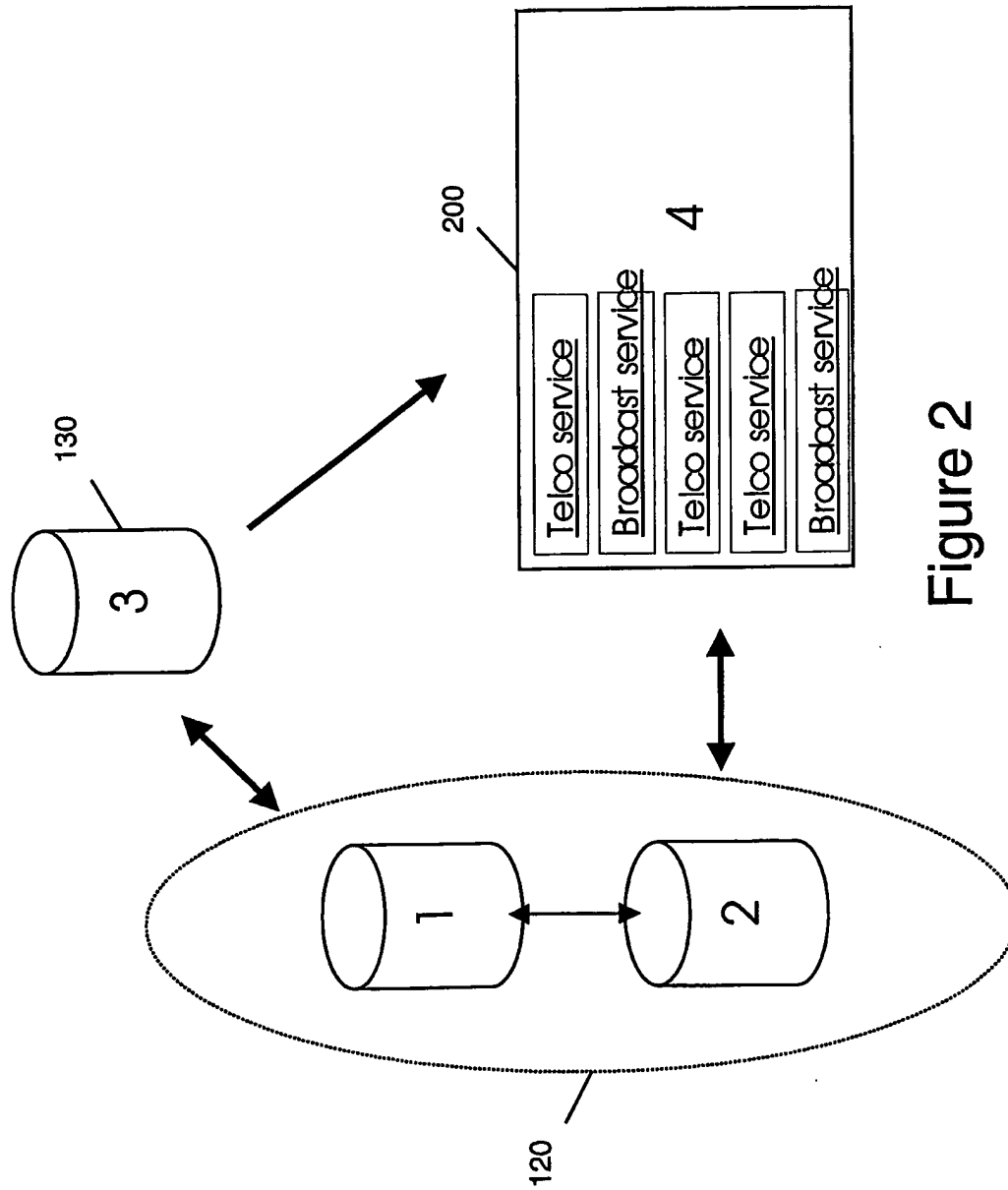


Figure 2

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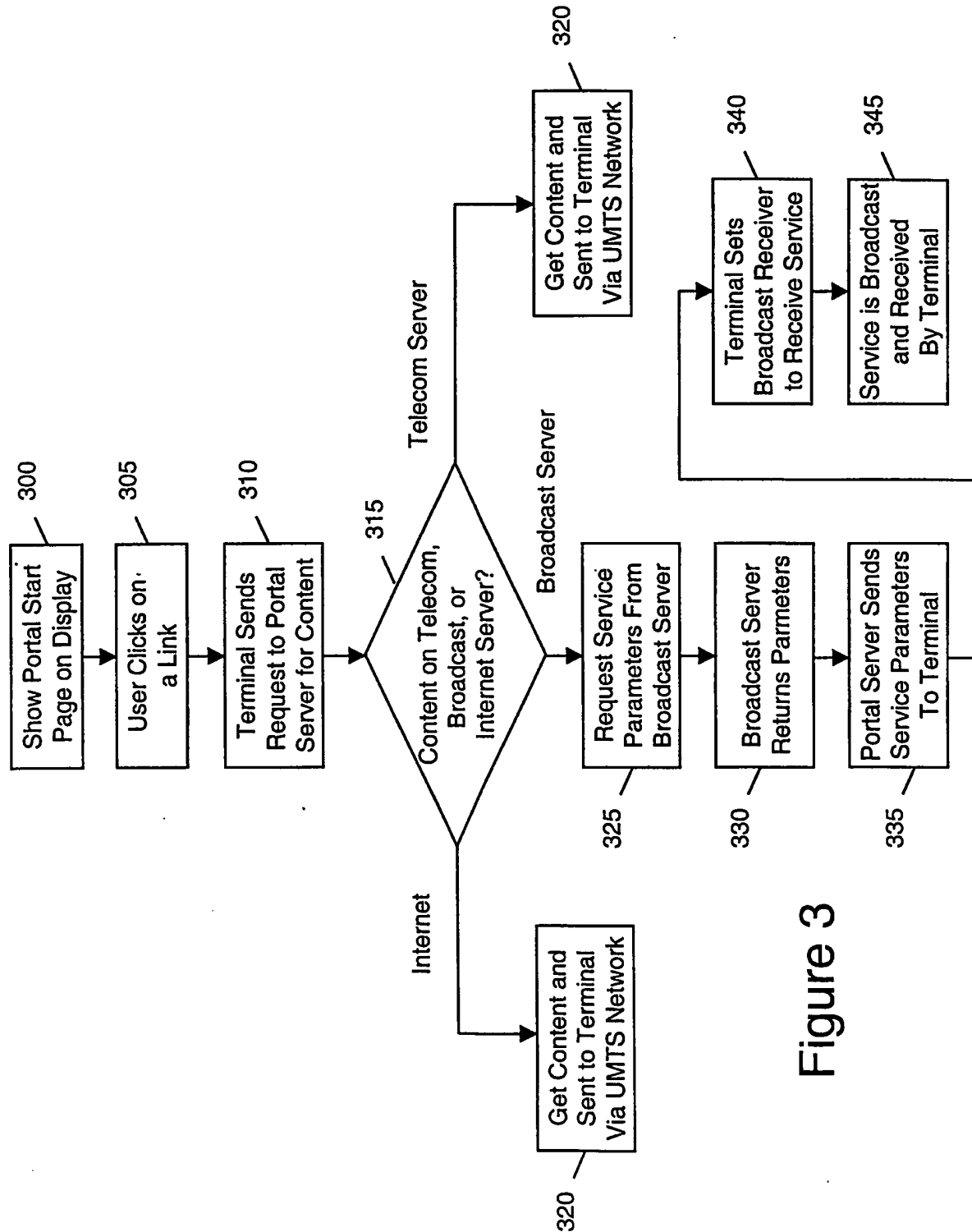


Figure 3

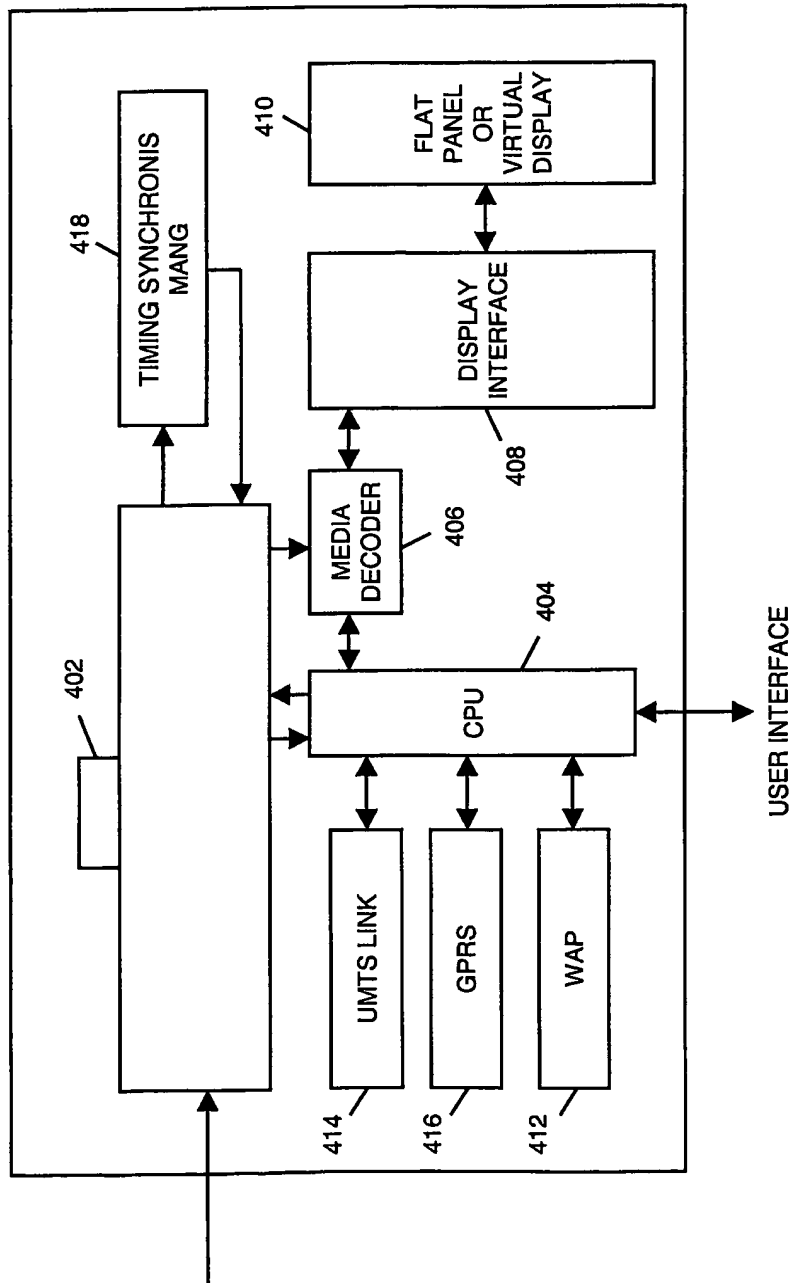


Figure 4

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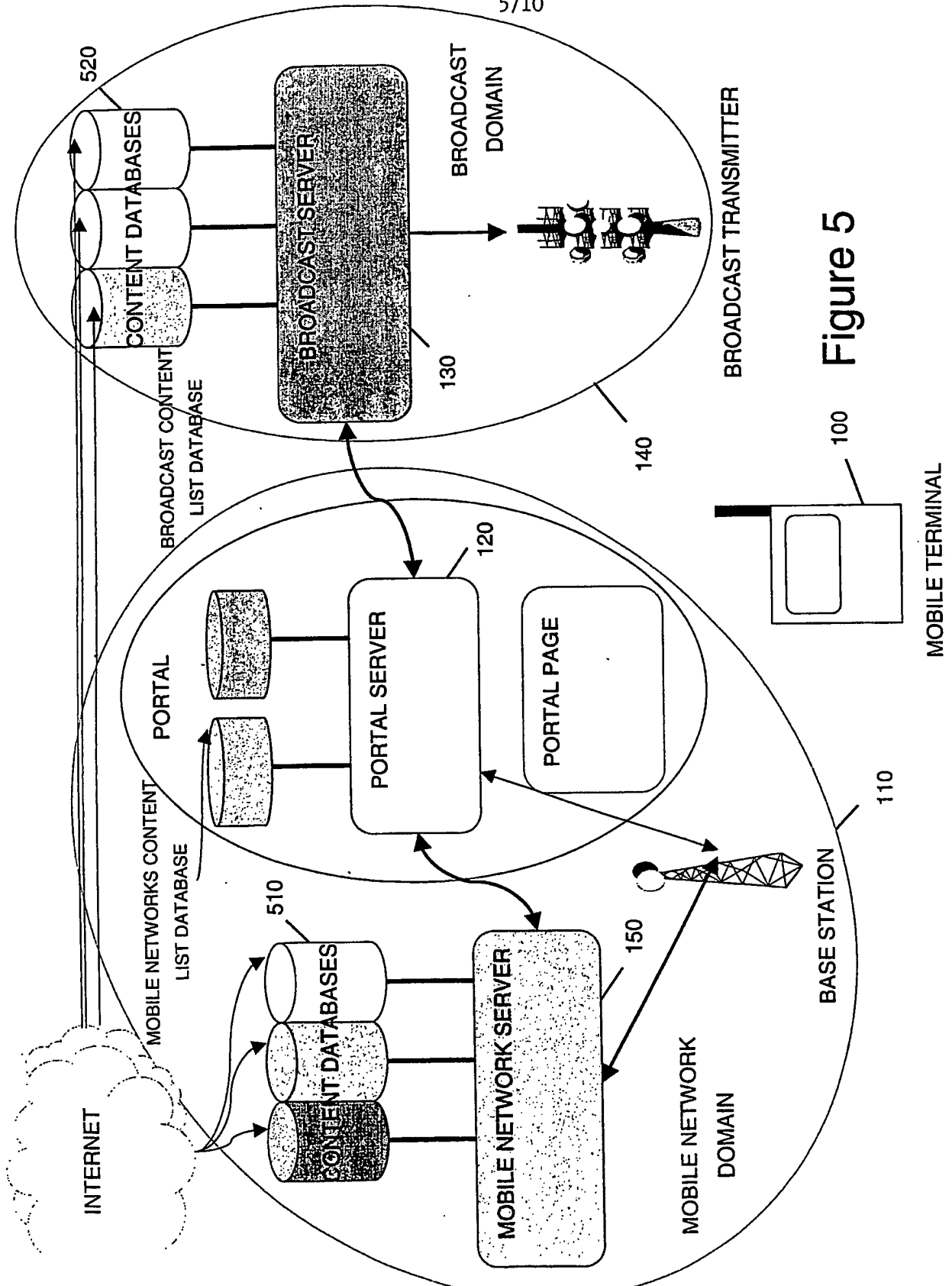


Figure 5

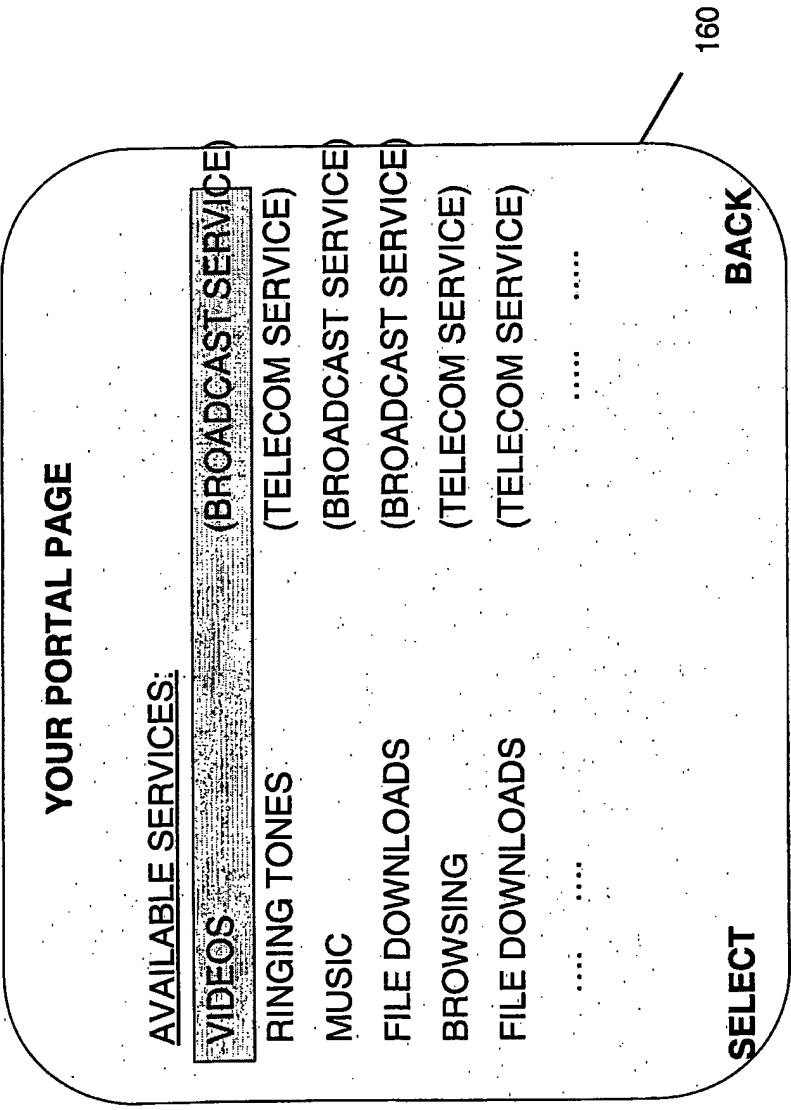


Figure 6

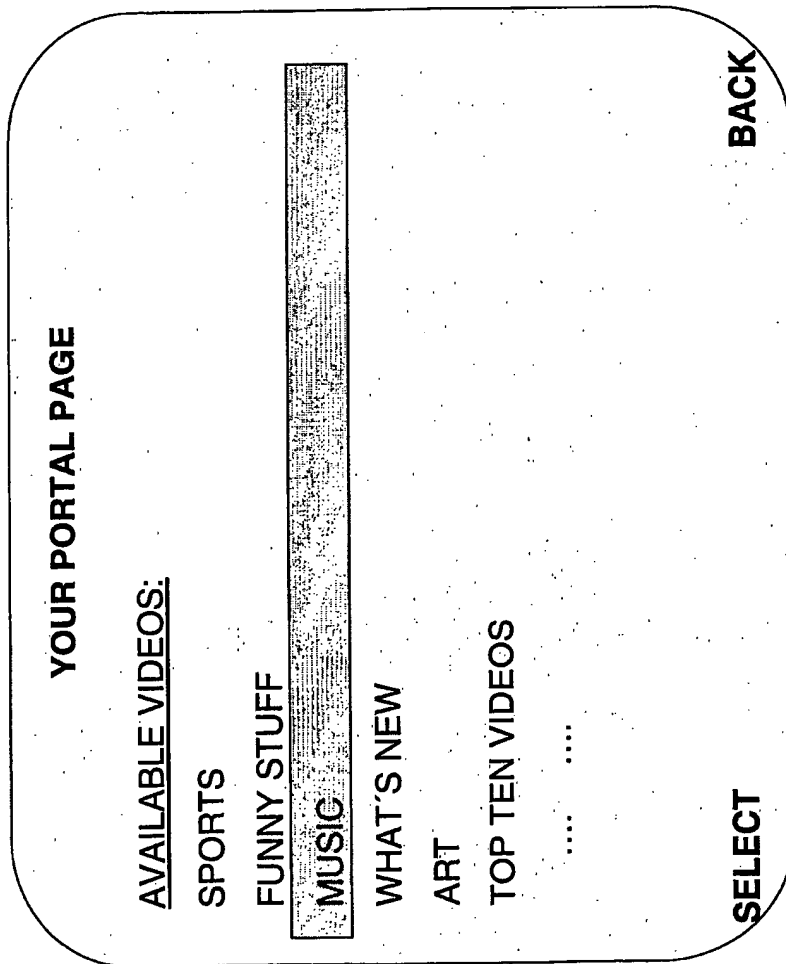


Figure 7

YOUR PORTAL PAGE

MUSIC VIDEOS:

KYLIE MINOQUE	"Can't get you out of my mind"
---------------	--------------------------------

SHAGGY	"Mr. Bombastic"
ALIEN ANT FARM	"Smooth Criminal"
THE OFFSPRING	"Self esteem"
DARUDE	"Sandstorm"
.....

SELECT
BACK

Figure 8

YOUR PORTAL PAGE

AVAILABLE SERVICES:

VIDEOS

(BROADCAST SERVICE)

RINGING TONES

(TELECOM SERVICE)

MUSIC

(BROADCAST SERVICE)

FILE DOWNLOADS

(BROADCAST SERVICE)

BROWSING

(TELECOM SERVICE)

FILE DOWNLOADS

(TELECOM SERVICE)

.....

.....

SELECT

BACK

Figure 9

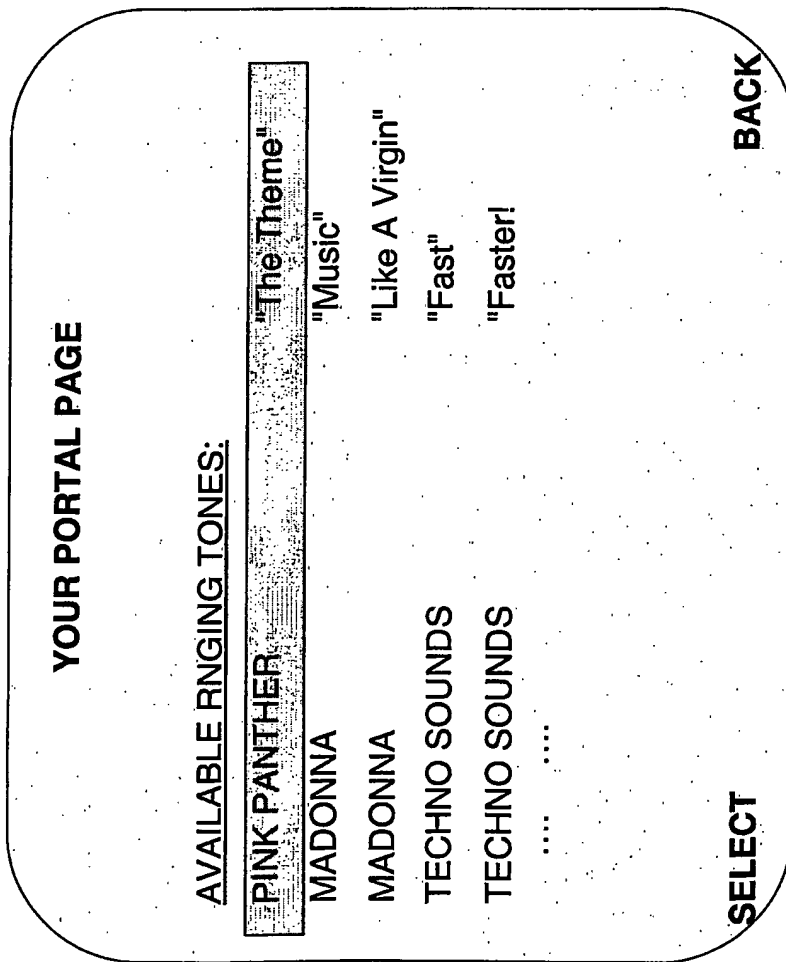


Figure 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00912

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04N 7/24, H04Q 7/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04N, H04H, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9933076 A1 (TERACOM AB), 1 July 1999 (01.07.99), page 4, line 23 - page 5, line 32; page 6, line 4 - line 22; page 12, line 19 - page 13, line 5, abstract	1-3,5-10, 13-34
Y	--	4,11-12, 35-36
Y	WO 9727546 A1 (EX MACHINA, INC.), 31 July 1997 (31.07.97), page 12, line 21 - page 13, line 3; page 48, line 30 - page 50, line 9, abstract	4,11-12,35
	--	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

26 February 2003

Date of mailing of the international search report

21-02-2003

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00912

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	ETSI EN 300 468 V1.4.1 (2000-11) Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DBV systems pages 6-12 see page 6 and 10 --	36
A	Keller, W. et al IP based enhanced data casting services over radio broadcast networks Universal Multiservice Networks, 2000. ECUMN 2000. 10/02/2000-10/04/2000 Location: Colmar, France on page(s) 195-203 2000 see whole document --	1-36
A	EP 1022884 A1 (CANAL+SOCIETE ANONYME), 26 July 2000 (26.07.00), column 3, line 8 - line 14, abstract --	1-36
A	GB 2313981 A (ROKE MANOR RESEARCH LIMITED), 10 December 1997 (10.12.97), page 7, line 5 - page 10, line 5, figure 1, abstract -- -----	1-36

INTERNATIONAL SEARCH REPORT

Information on patent family members

30/12/02

International application No.

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				CZ	20012715 A	17/04/02
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				IL	144441 D	00/00/00
				JP	2002535926 T	22/10/02
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				GB	9611830 D	00/00/00
				GB	9613404 D	00/00/00